

Cumulative incidence of infertility in a New Zealand birth cohort to age 38 by sex and the relationship with family formation

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Objective: To estimate the cumulative incidence of infertility for men and women in a population-based sample.

Design: Longitudinal study of a birth cohort.

Setting: Research unit.

Patient(s): A population-based birth cohort of 1,037 men and women born in Dunedin, New Zealand, between 1972 and 1973.

Intervention(s): None.

Main Outcome Measure(s): Cumulative incidence of infertility by age 32 and 38, distribution of causes and service use for infertility, live birth subsequent to infertility, and live birth by age 38.

Result(s): The cumulative incidence of infertility by age 38 ranged from 14.4% to 21.8% for men and from 15.2% to 26.0% for women depending on the infertility definition and data used. Infertility, defined as having tried to conceive for 12 months or more or having sought medical help to conceive, was experienced by 21.8% (95% confidence interval [CI], 17.7–26.2) of men and 26.0% (95% CI, 21.8–30.6) of women by age 38. For those who experienced infertility, 59.8% (95% CI, 48.3–70.4) of men and 71.8% (95% CI, 62.1–80.3) of women eventually had a live birth. Successful resolution of infertility and entry into parenthood by age 38 were much lower for those who first experienced infertility in their mid to late thirties compared with at a younger age.

Conclusion(s): Comparison of reports from two assessments in this cohort study suggests infertility estimates from a single cross-sectional study may underestimate lifetime infertility. The lower rate of resolution and entry into parenthood for those first experiencing infertility in their mid to late thirties highlights the consequences of postponing parenthood and could result in involuntary childlessness and fewer children than desired. (Fertil Steril® 2015;103:1053–8. ©2015 by American Society for Reproductive Medicine.)

Key Words: Infertility, cumulative incidence, live birth, cohort study

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Infertility is a global public health issue associated with psychosocial distress and is a heavy burden on public health services and individuals requiring assistance (1–6). The current trend toward delaying childbearing could further increase this burden as increasing age reduces fecundity, and

individuals experiencing infertility may not be able to have as many children as they desire (5, 7). While reduced fertility is most pronounced for women after age 35, increasing age for men may also pose problems, particularly when both parents are older (8–10). This highlights the com-

plex relationships among infertility, sex, and age. Despite the importance of these issues for individuals, few population-based studies have assessed the relative burden of infertility on men and women and the overall impact on family formation within this postponement context.

A clear understanding of the extent of infertility in the general population has been hindered by the use of different infertility definitions, which account for some of the wide variation in the estimates documented (3, 4, 11, 12). Furthermore, while male factors are recognized as an important

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contributor to infertility, data for men are limited to those obtained through clinic-based samples or from information reported by women (10, 13). Moreover, clinic-based samples may not include all of those with difficulty conceiving (3, 14, 15). Thus there is a need for reliable estimates for both sexes from population-based samples.

The Dunedin Multidisciplinary Health and Development Study (DMHDS) is uniquely positioned to examine these issues as it is a longitudinal study of men and women in a population-based birth cohort followed to age 38. Detailed reproductive histories have been prospectively collected at several assessments along with information on infertility at ages 32 and 38. This allowed the experience of infertility, infertility resolution, and family formation to be explored in this representative sample.

The aims of this analysis were to estimate the cumulative incidence of infertility for both sexes and to investigate the impact of infertility on live birth and parenthood by age 38.

MATERIALS AND METHODS

Study Population and Measures

Participants enrolled in the DMHDS were a cohort of everyone born between April 1972 and March 1973 in Dunedin, New Zealand, who lived in the province and participated in the first follow-up assessment at age 3. Ethical approval was given by the Otago and the Southern Regional Ethics Committee as relevant for each stage of the study (reference LRS/10/03/012/AM03).

The formation of the sample has been described (16). At age 21, compared with their age group in the country overall, many demographic features were similar, but the sample had a slightly higher level of educational achievement and fewer people of Māori ethnicity (17). At age 26, compared with those aged 25–26 in the New Zealand Health and National Nutrition Surveys, many measures of health were similar such as body mass index, smoking habit, and health service use, although men in the cohort spent a little more time doing vigorous physical activity. The cohort scored similarly on five out of eight SF-36 subscales assessing physical, social, and emotional health (18). Detailed information on sexually transmitted infections (STIs), sexual identity, and aspects of sexual partnering has been described elsewhere and is summarized in Supplemental Table 1 (19–22). Socioeconomic status at age 38 was assessed using the New Zealand socioeconomic index (23).

Information on reproductive health was sought through a computer questionnaire at the age 21, 26, 32, and 38 assessments. At age 38, this included whether the study member was in an opposite-sex relationship, the status of this relationship, the relative age of their current sexual partner, and their sexual orientation. At all four assessments, participants were asked about numbers of opposite-sex sexual partners and STIs.

Reproductive histories were collected at the age 21, 26, 32, and 38 assessments from those who had ever experienced opposite-sex intercourse, with information on age at the start of each pregnancy and the outcome for all pregnancies to age 38. At the age 32 and 38 assessments they were asked about

difficulties conceiving, and at the age 38 assessment they were asked whether they wanted to have children in the future.

Questions on infertility were restricted to those who had ever experienced opposite sex intercourse; this precluded four men and five women from answering these questions. Participants were asked, at both the age 32 and 38 assessments, whether they and a partner had ever tried for 12 months or more to get pregnant without success and the age this first occurred. At the age 32 assessment, those who reported this were asked whether they had ever sought medical help to get pregnant, whereas at the age 38 assessment all participants were asked whether they had sought medical help and the age they first did so. At both assessments, those who sought medical help were asked the cause of their infertility and any treatment received and whether this had resulted in a successful pregnancy. Those who did not seek help were asked whether they became pregnant without seeking help.

Measures of infertility were constructed using information from the age 32 and 38 assessments separately and then combined, with those who had ever reported or attempted a pregnancy as the denominator. These measures were used to determine who had ever tried to conceive without success for 12 months or more, who had ever sought medical help to conceive, and who had met either of these criteria. The age at which infertility first occurred, or that medical help was sought, was grouped as 24 years or younger, 25–32 years, and 33–38 years to assess the relationship with a subsequent live birth after infertility and with any live birth by age 38.

Participants reported all causes for infertility; these were used to determine who met the criteria for a known female factor, male factor, or a combined male and female factor. They also reported any treatments received including advice, testing, ovulation drugs, surgery, artificial insemination, IVF, and other. They were then given the opportunity to specify the other treatment they received. Those who were given only advice or testing were considered to have not received treatment.

Analysis and Statistics

The proportions of participants reporting a live birth by age 38 and who desired future children were calculated for the whole sample. The cumulative incidence of infertility by ages 32 and 38 was calculated for those who ever reported or attempted a pregnancy. For those who experienced infertility, the proportion reporting known causes and service access was calculated, and the proportion that reported a subsequent live birth was compared by characteristics of infertility. Chi-square tests were used to assess differences between categorical variables (Fisher's exact test where the expected value was less than 5), and 95% confidence intervals (CIs) were calculated for all estimates.

For those who reported or attempted a pregnancy by age 38, Poisson regression (with robust standard errors) was used to estimate the relative risk (RR) of live birth by age 38 and 95% CIs, by characteristics of infertility. Stata v. SE 12.1 was used for all analyses.

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